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1,909,602

SLIP WITH REMOVABLE LINER

Original Filed Jan. 11, 1928

2 Sheets-Sheet 1

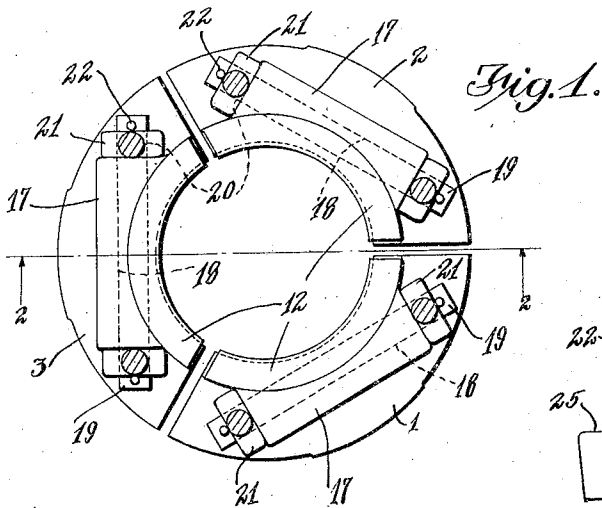


Fig. 1.

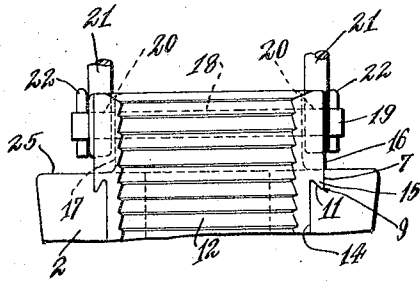


Fig. 3.

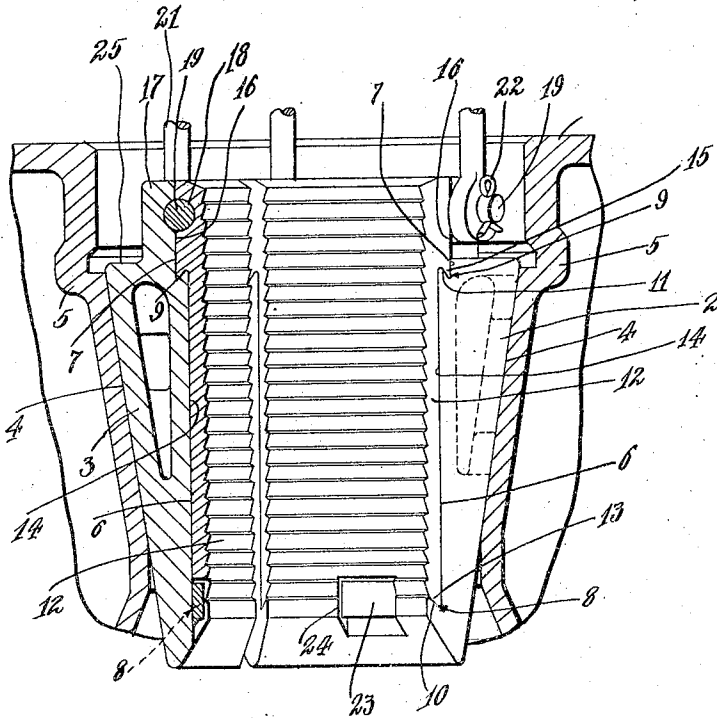


Fig. 2.

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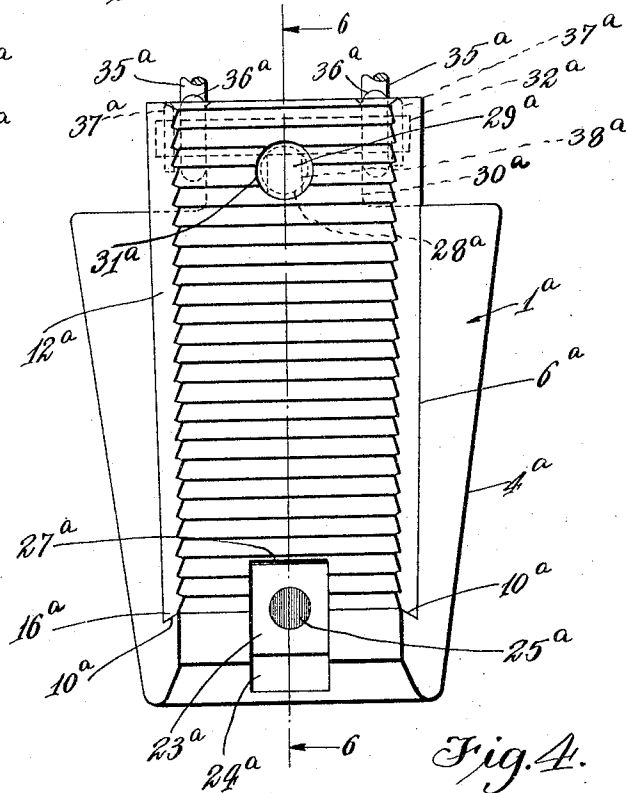
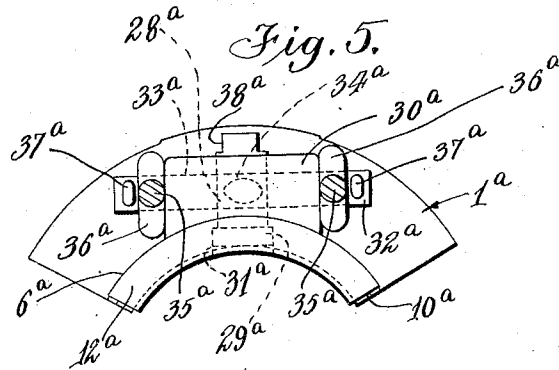
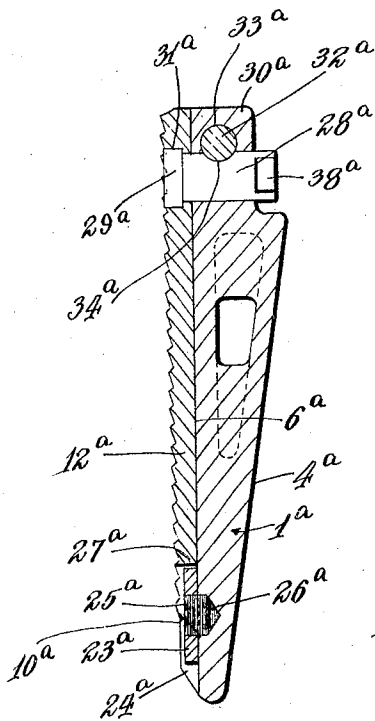
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Fig. 6.



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UNITED STATES PATENT OFFICE

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SLIP WITH REMOVABLE LINER

Application filed January 11, 1928, Serial No. 245,876. Renewed September 14, 1931.

This invention relates to slips with removable liners, and is more particularly related to slips such, for example, as are adapted for use in rotary machines, slip elevators, spiders, and the like, having removable or renewable liners mounted upon the inner periphery of the segmental slips and providing the gripping surfaces for the slips.

Slips with removable liners have heretofore been provided for use in rotary machines, slip elevators, spiders, and the like, in order to provide the slips with replaceable or removable gripping surfaces so as to eliminate the necessity of providing an entirely new slip when the gripping surface has become worn. These slips, however, have had the liners removably mounted therein in such a manner as to either reduce the gripping surface provided on the inner periphery or in such a manner as to make the removal of the liners difficult.

It is, therefore, an object of this invention to provide an improved form of slip having a removable liner including a slip body formed to the shape or form desired and having on its inner periphery stepped, tapered shoulders into which correspondingly stepped portions of the liners fit in order to hold the slips from downward movement relative to the body of the slips.

Another object of this invention is to provide a slip having an insert liner, the gripping surface of which liner is equal to or greater than the gripping surface which would be provided if the inner periphery of the slip were formed to provide a gripping surface.

Another object of this invention is to provide a slip having a renewable liner, means for holding the liner from longitudinal movement downwardly relative to the body of the slip, means at the upper end of the liner and body for preventing longitudinal movement of the liner relative to the body upwardly, and for holding the liner at the upper end from rotative movement relative to the body of the slip, and means at the lower end of the liner and body of the slip

for preventing relative rotative movement thereof.

Other objects and advantages of this invention, it is believed, will be apparent from the following detailed description of a preferred embodiment thereof, as illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a top plan view of a plurality of segmental slips embodying this invention.

Figure 2 is a sectional elevational view taken substantially on the line 2—2 of Figure 1, illustrating the slips as mounted in position in a fragment of a tapered body.

Figure 3 is a fragmental front elevational view of a rotary slip embodying this invention.

Figure 4 is a front elevation of a modified form of segmental slip embodying this invention.

Figure 5 is a top plan view of the slip illustrated in Figure 4.

Figure 6 is a sectional edge elevation taken substantially on the line 6—6 of Figure 4.

In the preferred embodiment of this invention, illustrated in the accompanying drawings, 1, 2, and 3 illustrate segmental slips, any desired or preferred number of which may be employed in order to provide a complete gripping cylinder upon the inner periphery of slips. The slips 1, 2 and 3 are all of the same construction and are provided with exterior tapered peripheries, as illustrated at 4, tapered complementary to the inner tapered passage formed through a body 5. The body 5 may be a rotary table, bushing, elevator body or body of a spider or other device embodying a slip such, for example, as are commonly employed in the oil production industry.

The inner surface of the body of the slips is formed to provide two stepped substantially vertically extending walls 6 and 7, which terminate in annular recesses 8 and 9, providing upwardly tapering shoulders 10 and 11, respectively. The slips are provided with liners 12 which are formed tapered at their lower end, as illustrated at 13, com-

plementary to the lower taper 10 of the body of the slip and providing a vertically extending surface 14 adapted to engage the vertically extending wall 6 of the body of the slip. The vertically extending surface of the liner 12 terminates in a shoulder 15 having a taper complementary to the upper taper 9 of the body of the slip and the slip extends upwardly from the annular shoulder 15 along a vertically extending surface 16 which engages the vertically extending surface 7 of the body of the slip. The annular engaging portions of the liner and slip above described prevent movement of the liner 12 downwardly relative to the body of the slip.

Means are provided for holding the liners 12 from vertical upward movement relative to the body of the slips and which means preferably comprise means for securing to the body of the slip bails by means of which the slips may be raised from the body 5, which means are preferably of the following construction:

Formed at the upper end of the slips is an upwardly projecting substantially rectangular portion 17 having a curved inner periphery complementary to the curved outer surface of the liner 12. Formed through the portion 17 of the body of the slip and the upper end of the liner 12 is a bore 18 through which a pin 19 is inserted. The pin 19 passes through the eyes 20 of the bail 21 and is provided with cotter pins 22 at its opposite ends which hold the pin 19 in position. The pin 19 by this means holds the liner 12 from vertical upward movement relative to the body of the slip and also acts to prevent relative rotative movement of the liner 12 relative to the body of the slip. In order to hold the liner 12 at the lower end from rotative movement relative to the body of the slip, a plate 23 is provided which is mounted in a cut out portion formed in the lower end of the body of the slip and secured in position by any suitable or desirable means such, for example, as welding the same in position. The plate 23 fits within a cut out recess 24 formed in the lower end of the liner 12, thereby holding the lower end of the liner 12 from rotative movement relative to the body of the slip.

In order to provide a maximum of gripping surface, the liners 12 are all of a segmental length equal to the segmental length of the inner surface of the slips and also extend vertically upward above the upper surface 25 of the body of the slip. The liners 12 are formed on their inner periphery with any suitable form of irregular or serrated surface to provide gripping means for gripping the plain exterior surface of pipes, casings, drill stems, or the like.

In the modified form of slip illustrated in Figures 4, 5, and 6, 1a indicates a segmental

slip having an exterior tapered periphery, as illustrated at 4a. The inner periphery of the slip 1a is formed to provide a vertically extending wall 6a which terminates in an upwardly tapering shoulder 10a at the bottom of the slip 1a. A liner 12a having a complementary curved periphery is mounted in engagement with the wall 6a with its tapered end 16a engaging the upwardly tapered shoulder 10a formed in the bottom of the slip 1a.

The body of the liner 12a at its outer periphery is tapered from its upper to its lower end to correspond with the complementary taper formed on the inner periphery of the slip body. This tapering of the liner 12a and the slip 1a results in the bearing pressure as applied to the liner 12a being greatly reduced at the lower shoulder 10a due to the supporting effect attained by the engagement of the tapered liners 12a with the slip 1a.

Means are provided for holding the liner 12a from sliding transversely of the slip 1a which means preferably comprise a plate 23a which is fitted within a rectangular recess 24a formed at the bottom of the slip 1a. The plate 23a is held in position by welding a pin 25a through the plate 23a and into the slip 1a, as illustrated at 26a. The plate 23a fits within a rectangular recess 27a formed in the end of the liner 12a. The plate 23a is not secured to the liner 12a but merely engages the liner within the recess 27a to prevent the lower end of said liner 12a from moving laterally in the slip 1a. Means are provided at the upper end of the slip for holding the liner 12a from moving either laterally or longitudinally relative to the slip 1a and also for locking the upper end of the liner 12a from moving away from the walls 6a of the slip 1a, which means preferably comprise a pin 28a provided with a head 29a. The pin 28a extends through a bore formed through the liner 12a and upwardly extending portion 30a of the slip 1a. The head 29a fits within a cylindrical recess 31a formed in the face of the liner 12a. Means are provided for locking the pin 28a in position, which means preferably comprise a rod 32a which is passed through a transverse bore 33a formed in the upwardly extending portion 30a of the slip 1a and which rod 32a fits within an arcuate recess 34a formed in the shank of the pin 28a. The rod 32a also provides means for securing a bail 35a to the slip 1a, the rod 32 passing through eyes 36a formed at the end of the bail 35a. The rod 32a is held in position by means of cotter pins 37a.

In order to permit the pin 28a to be easily assembled in locking position, the same may be provided with a squared end 38a over which a wrench may be fitted to rotate the

same to position to permit the rod 32a to pass through the arcuate recess 34a.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A sectional slip including a body, a liner mounted on the inner periphery of said body, a shoulder formed at the lower end of said body on which the end of said liner fits, a plate secured to the body and fitting within a recess formed at the lower end of the liner to hold the liner from moving transversely of said body, and means at the upper end of said liner for securing said liner to the slip.

2. A slip including a body having an inner wall, a liner mounted on the inner periphery of said body in engagement with the inner wall, a shoulder formed in the body near the lower end and on which the lower end of said liner fits to hold the liner from movement longitudinally relative to said body, a pin passed transversely through said liner and body, and means for removably locking said pin in position.

3. A sectional slip including a body, a liner mounted on the inner periphery of said body to engage a shoulder at its lower end to hold the liner from movement longitudinally downwardly relative to said body, a pin passed through the liner and body, a rod passing through a portion of said body in engagement with said pin to lock the pin in position, and a lifting bail secured to said rod.

4. A sectional slip including a body having a tapered shoulder at its lower end, a liner mounted on the inner periphery of said body with its end extended into engagement with said tapered shoulder, a plate secured to said body and adapted to fit within a recess formed in the liner to hold the liner from movement transversely relative to said body, and a pin passed through the liner and body for holding the liner from moving outwardly away from said body, and means for removably locking the pin in position.

5. In a slip, the combination of a body adapted to be removably mounted within a bore formed through the body of a slip carrier, the slip body being formed with a shoulder at its lower end, a liner mounted on the inner periphery of said slip body with its lower end in engagement with said shoulder, a plate permanently secured to the body of the slip and adapted to fit within a recess formed in the end of said liner to hold the liner from moving transversely relative to said slip, a pin passed through the liner and said slip body to hold the liner from movement away from said slip body at its upper end, and a rod passed through said

body and fitting within a recess formed in said pin to removably hold said pin to said body, and a lifting bail secured to said rod.

6. In a device of the class described, the combination of a body having an inner surface, a serrated liner, the body having a shoulder at the lower end of the inner surface against which the end of the liner engages, means at the upper end of the body to grip the liner to hold the same from transverse movement relative to said body, a handle for the body, and means for securing the handle to the body and providing a lock pin cooperating with the means at the upper end of the body for holding the liner to said body near the upper end of said body.

7. In a device of the class described, the combination of a body having an inner surface, a serrated liner, the body having a shoulder at the lower end of the inner surface against which the end of the liner engages, means adapted to fit within a cut-out recess formed at the end of the liner to hold the liner from transverse movement relative to the body, and means removably secured to the body at its upper end for holding the liner from transverse movement relative to the body.

8. In a device of the class described, the combination of a body having a tapered outer surface, a liner, a bail, a pin to which the bail is secured and said pin forming a lock pin, means engaging said liner and lock pin for removably locking the liner to the body at the upper end of the body.

9. In a device of the class described, the combination of a body, a liner, a pin passed through the liner and the arcuate body at the upper end of the liner, and a rod passed transversely through the body and forming a lock pin for locking the first said pin in position.

10. In a device of the class described, the combination of a body, a liner, a bail, a pin passed through the liner and the body at the upper end of the liner, a rod passed transversely through the body and forming a lock pin for locking the first said pin in position, a bail for the slip, and the rod forming means for securing the bail to said body.

11. In a device of the class described, the combination of a body, a serrated liner, the body having a tapered shoulder at its lower end against which the lower tapered end of the liner engages, means at the lower end of the body to engage the liner to hold the same from transverse movement relative to said body, a pin passed through the liner and the body, a bail, and a rod passed through the body and providing means for securing the bail to the body and for holding the said pin in position.

12. In a device of the class described, the combination of a body, a liner, the outer

periphery of the liner being tapered downwardly from the upper end and the inner adjacent periphery of the body being complementarily tapered, a shoulder formed
5 near the lower end of the body upon which the liner is supported, and means engaging the liner and body to hold the liner from moving upwardly away from said shoulder.

13. A slip of the character described, comprising a body having an upwardly facing
10 shoulder on its inner face adjacent the lower end thereof, a replaceable liner including pipe gripping means applied to its inner face and seated at its lower end on said shoulder,
15 the upper end of the body and liner having aligning means, and a retaining means secured to the body and having a part engaging the liner from the inner face of the liner for preventing displacement of the liner
20 relative to the body.

14. In a device of the class described, the combination of a sectional slip having a body, a liner, the body having a shoulder
25 near its lower end against which the end of the liner engages, means at the upper end of the body to engage the liner and hold the same from transverse movement relative to said body, a lock engaging said body and said means for securing the latter in place.

30 15. A device of the class described, the combination of a sectional slip having a body, a liner, the body having a shoulder at its lower end against which the end of the liner engages, means at the upper end of the
35 body to engage the liner and hold the same from transverse movement relative to said body, a lock pin engaging said body, and said means for securing the last said means in place.

40 16. In a device of the class described, the combination of a body, a liner, means at the upper end of the body to engage the liner and hold the same from transverse movement relative to said body, a lock pin on
45 said body cooperating with the latter said means for holding the liner to the body near the upper end thereof.

17. In a device of the class described, the combination of a sectional slip having a
50 body, a liner, the body having a shoulder at its lower end against which the end of the liner engages, means at the upper end of the body to engage the liner and hold the same from transverse movement relative to the
55 body, a lock pin engaging the said body, and means for securing the lock pin in place on said first mentioned means.

Signed at Torrance, California, this 30th day of December 1927.

60 FORREST J. YOUNG.